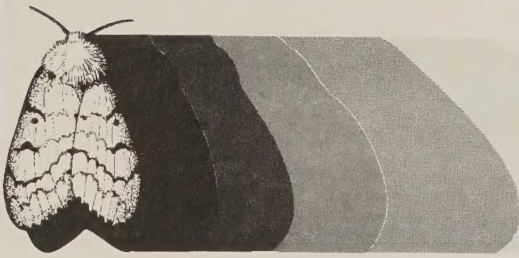


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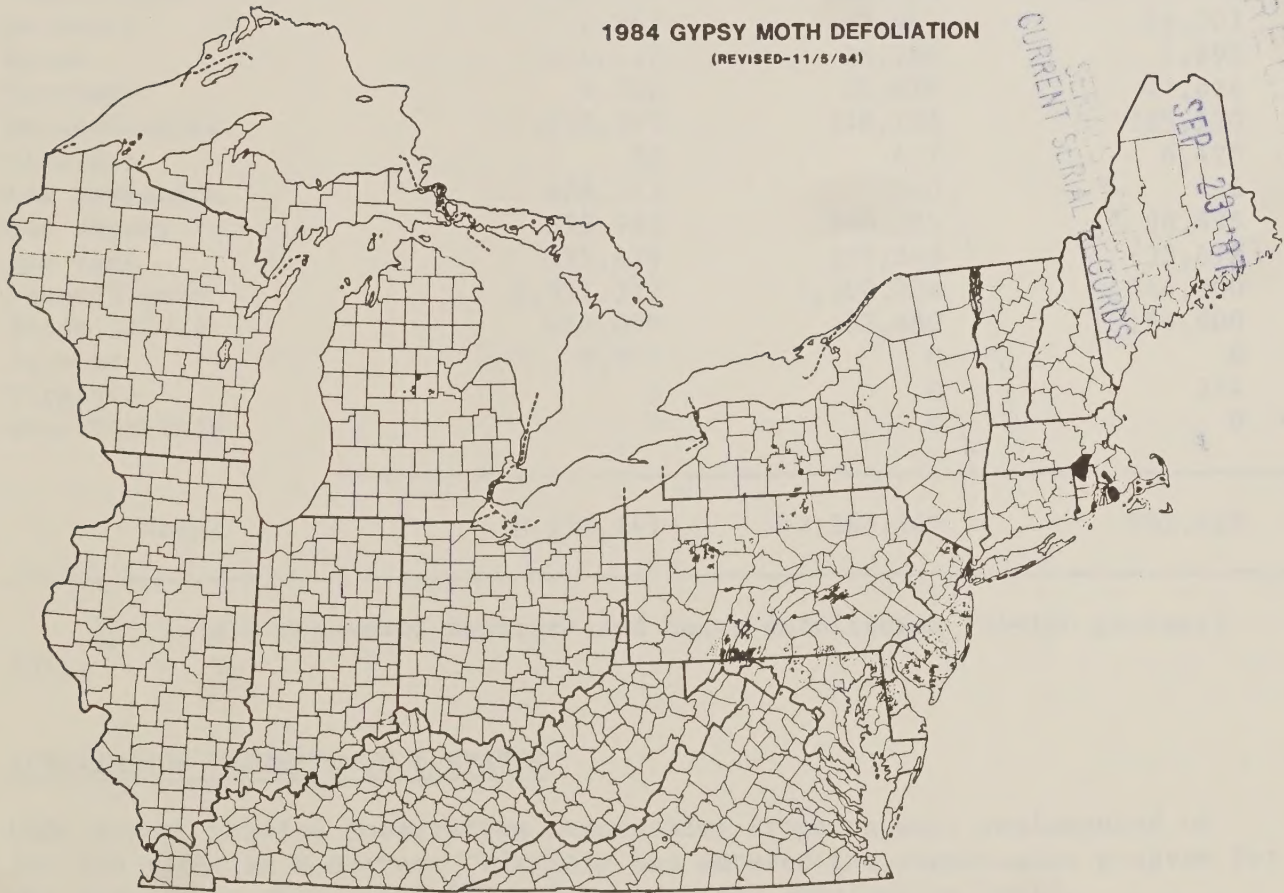


DECEMBER 1985
Number Eight

GYPSY MOTH NEWS

370 REED ROAD, BROOMALL, PA 19008
U.S.D.A., FOREST SERVICE

1984 GYPSY MOTH DEFOLIATION
(REVISED-11/5/84)



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1984 IN REVIEW

CONTINUING DOWNWARD TREND IN DEFOLIATION

Gypsy moth defoliation continued its downward trend in many areas of the Northeast, while appearing for the first time in Virginia.

Table 1. Acreage Defoliated by Gypsy Moth, 1982-83 ^{1/}

State	1982	1983	1984
Connecticut	803,802	153,239	544
Delaware	1,265	2,992	14,203
Maine	574,537	16,285	1,892
Maryland	9,162	15,870	41,824
Massachusetts	1,383,265	148,133	185,520
Michigan	92	457	6,425
New Hampshire	878,273	560	0
New Jersey	675,985	340,285	98,695
New York	825,629	290,843	33,678
Pennsylvania	2,351,317	1,360,824	444,900
Rhode Island	658,000	53,880	164,600
Vermont	9,864	0	0
Virginia	0	0	374
West Virginia	0	0	0
Total	8,171,191	2,383,368	992,655

^{1/} Totals represent moderate and heavy defoliation (31-100 percent) only.

SUPPRESSION PROJECTS IN 6 STATES

USDA Forest Service Cooperative Suppression Projects were implemented on 507,250 acres in 6 States. Virginia has entered the suppression program for the first time spraying 4,000 acres along the Appalachian Trail.

Table 2. 1984 Gypsy Moth Suppression

State	Suppression Ac.	Observed Defoliation Ac.
Connecticut	0	544
Delaware	29,120	14,203
Massachusetts	0	185,520
Maryland	107,597	41,824
Maine	0	1,892
Michigan	0	6,425
New Hampshire	0	0
New Jersey	39,524	98,695
New York	0	33,678
Pennsylvania	280,035	444,900
Rhode Island	0	164,600
Virginia	4,000	374
Vermont	0	0
West Virginia	46,992	0
TOTAL	507,268	992,655

COOPERATIVE ERADICATION PROJECTS - APHIS; 1984

The eradication of isolated gypsy moth infestations by the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) in cooperation with State Department's of Agriculture continues in many areas. Approximately 40,000 acres were treated in 1984 to eradicate 33 gypsy moth infestations in the following States: Washington, Oregon, California, Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Virginia, Tennessee, and North Carolina (see Table 2). About one-half of this acreage was treated with Bacillus thuringiensis (B. t.); 15,000 acres with Dimilin; and the remaining with Sevin, Luretape, mass trapping, or Orthene.

Post treatment surveys in all treatment blocks indicate the risk of spread from these areas has been eliminated. New major areas of infestation were identified in Lane County, Oregon, and outside treatment areas in Johnson County, Tennessee, and Watauga County, North Carolina. Approximately 1100 square miles in Lane County are under regulation because of the regulatory risk presented by commercial logging activities and Christmas tree nurseries. Decisions relative to regulating areas in TN or NC are being delayed pending results of surveys planned for later in the year.

Table 3. Cooperative Eradication Programs Conducted by States and APHIS

State	County	Acres	Material
California	San Diego (San Diego)	115	<u>B. t.</u>
		90	Carbaryl
	San Jose (Santa Clara)	220	Carbaryl
	Livermore (Alameda)	165	Carbaryl
	Oakland (Alameda)	170	Carbaryl
	Danville (Alameda)	300	Carbaryl
Minnesota	Sauk Rapids (Benton)	26	<u>B. t.</u> and MT
	St. Anthony (Hennepin)	30	<u>B. t.</u> and MT
	Stillwater (Washington)	32	<u>B. t.</u>
Illinois	Aurora (Kane)	3.5	<u>B. t.</u> and MT
	Mundelein (Lake)	2.75	<u>B. t.</u>
Wisconsin	Oconomowoc (Waukesha)	35	<u>B. t.</u>
		140	MT
	Monona (Dane)	220	MT
Virginia	Montgomery Co.	1200	Dimilin
		320	Luretape
	Patrick Co.	525	Dimilin
Ohio	Columbus (Franklin)	50	Carbaryl
	Sylvania (Lucas)	90	Carbaryl
Michigan	(Menominee)	400	Carbaryl
	(Eaton)	200	Carbaryl
Indiana	Indianapolis (Marion)	85	<u>B. t.</u>
		235	MT
		75	<u>B. t.</u>
		220	MT
	Columbus (Bartholomew)	300	MT
	Goshen (Elkhart)	500	MT
	(St. Joseph)	250	MT
Tennessee	Johnson County	13,600	Dimilin
		1,200	<u>B. t.</u>
Oregon	Salem area (Marion)	8,460	<u>B. t.</u>
	Portland area (Multnomah)	2,240	<u>B. t.</u>
	Gresham (Multnomah)	320	<u>B. t.</u>
	Corvallis area (Benton)	640	<u>B. t.</u>
Washington	King County		
	Ravenna	3,586	<u>B. t.</u>
	Medina	80	<u>B. t.</u>
	Snohomish County	1,484	<u>B. t.</u>
	South Tacoma (Pierce)	1,665	<u>B. t.</u>
	Whatcom County	less than 1	Orthene
North Carolina	Watauga	650	<u>B. t.</u>
		550	Dimilin

Summary:

<u>B. t.</u>	19,919	12 States
Dimilin	15,325	40,599 acres treated
MT	2,103	
LT	360	
Orthene	5	

PENNSYLVANIA AND THE GYPSY MOTH

Pennsylvania remains one of the States hardest hit by defoliation. Since 1980, the State has treated approximately 1,350,000 acres, representing 59 percent of the total acres treated for gypsy moth suppression in the Northeast.

During 1984, defoliation decreased to 444,900 acres in 22 counties, a 67 percent reduction over that recorded in 1983. Three counties, Bedford, Fulton, and Somerset had 70 percent of the damage.

A potentially serious buildup has been detected in northwest Pennsylvania involving Forest, Jefferson, Clarion, Venango, and Warren Counties. Much of this area includes the Allegheny National Forest. Pennsylvania is currently conducting training of new county gypsy moth coordinators in these areas.

The 1984 suppression program in Pennsylvania began with cold weather in late April and early May and leaf development and gypsy moth egg hatch were delayed by 10 to 14 days across the State. The last week in May warm weather accelerated insect and foliage development and the late-starting program ended almost on schedule.

The first spraying was done in Cumberland County, with a Mobay growth-inhibiting insecticide called Alsystin^R. This material was put on early to see if adequate protection could be attained by spraying during bud expansion when a minimal amount of leaf surface is exposed.

Of 284,035 acres treated, 140,301 were treated with B.t. (112,057 at 12 BIUs per acre and 28,244 at 20 BIUs per acre), 139,734 with Dimilin, and 4,937 with Alsystin.

Evaluation of B.t. Treatments for Foliage Protection - 1984

It was concluded that B. t. at 20 BIUs per acre in a four-quart solution will provide adequate foliage protection with one application in healthy, building populations containing up to at least 6,500 egg masses per acre. White oak foliage should be at least one-third developed before starting spraying operations and the larvae in second and third stages. A single application of B. t. at 12 BIUs per acre in a three-quart solution is recommended for infestations of under 1,000 egg masses per acre. Tables 4, 5, and 6 show the results of the 1984 B. t. treatments.

New Gypsy Moth Suppression Program Guidelines for Pennsylvania

New spraying guidelines have been approved and issued to Pennsylvania county commissioners. The big change concerns giving local governments the option of remaining in a State-conducted program or conducting their own program.

Pennsylvania believes the time is right to begin looking down the road and start changing State involvement to meet changing conditions for what is bound to be a problem of indefinite and long-term duration. Most other northeastern States have followed a pattern of either gradually, or abruptly, turning over responsibilities for local gypsy moth problems to local governments.

Table 4. B. t. at 12 BIU's per acre (Dipel 6L), 3-quart solution in Pennsylvania. Four spray blocks evaluated--populations collapsed following treatment.

Block Number	Egg Mass/Acre	Defoliation Percent	
		Favored Hosts (Oak, etc.)	Overall Stand
1	340	5	5
2	270	5	5
Checks (2)	305	5	5
3	510	5	5
4	1,510	5	5
Checks (2)	1,005	5	5

Table 5. B. t. at 20 BIU's per acre (Dipel 8L), 4-quart solution in Pennsylvania. Forty-six spray blocks evaluated--healthy populations.

Block Number	Egg Mass/Acre	Defoliation Percent	
		Favored Hosts (Oak, etc.)	Overall Stand
1-13	250-500	10	5
Checks (8)	250-500	8	6
14-22	500-1,000	8	4
Checks (8)	500-1,000	52	32
23-30	1,000-1,500	20	10
Checks (5)	1,000-1,500	85	55
31-33	1,500-2,000	27	14
Checks (5)	1,500-2,000	77	51
34-37	2,000-2,500	20	12
Checks (8)	2,000-2,500	70	49
38-46	2,500+	24	18
Checks (9)	2,500+	78	61

Table 6. B. t. at 12 BIU's plus 12 BIU's per acre (Dipel 6L), 3-quart solution in Pennsylvania. Nine spray blocks evaluated--healthy populations.

Block Number	Egg Mass/Acre	Defoliation Percent	
		Favored Hosts	Overall Stand
1-9	3,400 average	32	16
Checks (5)	3,400	76	38

There are other reasons: scope of the problem continues to rise (only 15 of 67 counties do not, or have not, had a gypsy moth problem); greater program flexibility can be provided, even though essential guideline provisions are unchanged; some counties and some State legislators have requested a change; the need to relieve workload pressures on constantly dwindling Bureau of Forestry manpower; little or no possibility of environmental contamination with B.t. as the standard spray material. It should also be noted that probably 25-50 percent of the private land spraying currently being done is outside of the State program. Consequently, absolute control and direction is not essential to successful spraying.

As much as possible, the State will encourage local governments to conduct their own program. A 75-percent reimbursement would be provided, based on DER's equivalent cost of spraying. For 1985 spraying cost is estimated at \$12 per acre. Those counties remaining in a DER-conducted program would continue to pay 25 percent or \$3 per acre. Those doing their own spraying would receive \$9 per acre.

GARDEN STATE GYPSY MOTH

The New Jersey gypsy moth aerial sketch mapping survey was completed in July. The survey showed gypsy moth defoliation decreased substantially this spring from 340,285 acres to 98,695 acres. This represents the third consecutive year of declining gypsy moth populations in the State.

Of the total acres damaged, 66,405 sustained light defoliation, 46,200 sustained moderate-heavy defoliation and 52,495 were severely defoliated.

The hardest hit counties included Atlantic (35,145 acres), Cape May (16,080 acres), Cumberland (54,330 acres) and Passaic (14,735 acres).

Overall, defoliation decreased in every county except Bergen, Passaic, and Warren. The largest decline occurred in Sussex County where defoliation dropped from 41,245 acres in 1983 to 395 in 1984.

The continued decline in gypsy moth is primarily due to increased parasitoid activity and large virus loads in the population.

Post-Spray evaluation surveys, using square foot tar paper flaps, were conducted to determine larval reduction and foliage protection obtained from aerial application of either B. t. (Dipel) carbaryl (Sevin 4 Oil) or trichlorfon (Dylox 1.5) against gypsy moth larvae this past spring.

Overall, the larval reduction averaged 48 percent for B. t., 83 percent for trichlorfon and 94 percent for carbaryl. Larval reduction was about the same as last year for carbaryl and B. t. but they were much improved for trichlorfon (from 38 percent to 83 percent). Bacillus thuringiensis still appears to have difficulty in controlling egg mass population levels exceeding 2000/acre and as a result foliage protection and population reductions in these cases are generally poor. The average defoliation in the B. t. treated blocks was 15 percent and the carbaryl and trichlorfon treated blocks were 5 percent and 15 percent respectively.

Re-treatment of many of the B. t. spray blocks will be necessary next spring because of the high egg counts, observed, whereas the carbaryl treated areas will not need spraying for several years.

IN THE SOUTH

The State of Virginia recently entered the gypsy moth suppression program. Four thousand acres were treated with Dimilin in western Virginia. In addition, the State is involved in gypsy moth impact evaluation, parasite release, evaluation of fuelwood removals upon gypsy moth impact, and a cooperative project with the University of Maryland to evaluate procedures for monitoring field trends of NPV. Interested persons should contact C.L. Morris of the Department of Conservation and Economical Development, Charlottesville, Virginia, for more information.

Eradication efforts were conducted in North Carolina and Tennessee. Based upon 1984 trapping results, the infestation in Tennessee appears to be much larger in size (about 50,000 acres) than previously thought. The situation is currently being evaluated for continued eradication efforts. For more information, contact M.E. Cooper of the Tennessee Department of Agriculture, Plant Industries Division, Nashville, Tennessee.

WESTWARD MOVEMENT

Indiana - Phil Marshall of the Indiana DNR reports male moths trapped in 19 counties. Up from 6 last year. Mass trapping took place in 2 areas of Marion County. No defoliating infestations are expected in 1985.

Ohio - Dick Barth of the Ohio Department of Agriculture reports that 2 small eradication projects were successfully completed (one near Toledo and one near Columbus). Ohio uses approximately 16,000 traps per year to monitor gypsy moth activity throughout the State.

Minnesota - The two areas treated with carbaryl in 1983 and three areas treated with B. t. in 1984 produced no male moths this summer. Of 92 sites where moths were caught in traps, six produced multiple catches. Egg mass surveys are underway.

Michigan - Defoliation increased from 457 acres in 1983 to 6,425 acres in 1984. Positive catches in traps increased in terms of number of sites and in moths per trap.

Missouri - Only 13 males caught in traps. Most catches are in the St. Louis area.

Illinois - Cold weather and B. t. ground sprays wiped out the infestation in Du Page County near Chicago. Only 250 male moths were trapped State-wide this year and most of these were near Peoria. The city will treat 60 acres with B. t.

Wisconsin - Trap catches (79 males) less than half of 1983 total, although the number of sites producing moth catches remained the same. Egg mass surveys are underway.

Iowa - Some new sites for male moth trap catches, but not as many sites produced catches. Only one site had a multiple catch.

In general, gypsy moth populations were down from 1983. Cold weather in December probably had much to do with the reduction. The north central States remain in the eradication mode.

GYPSY MOTH RESEARCH

This and future issues of Gypsy Moth News will include information related to ongoing gypsy moth research. With that we welcome the contributions of Dr. Gerry Hertel, the Program Manager of the new USDA Forest Service Gypsy Moth Research Program. Here is Dr. Hertel's summary of the background and objectives of the new Research Program:

Gypsy Moth Research: 1984-1988 Forest Service-USDA and Cooperators

Previous research on the gypsy moth has provided an array of tools to control outbreaks of the pest. The next logical goal of research is to gain the knowledge and develop tools useful for extending the time between blowups of gypsy moth populations and ultimately to prevent blowups.

Based on new planning and increased funding in fiscal year 1984, researchers will focus on the gypsy moth when its population levels are at low levels and how to keep the pest at low levels.

After a period of several years during which data from previous studies were analyzed and new research approaches were tested, a renewed program of gypsy moth research was initiated to cover a 5-year-period beginning in 1984. This program of research is designed to develop the knowledge and technology that will be necessary to maintain gypsy moth populations at economically and socially acceptable levels through integrated pest management techniques.

This approach reflects the fact that previous research efforts have led to the registration and use of one biological and several chemical insecticides to control or suppress outbreak populations of the gypsy moth. It also reflects the fact that the gypsy moth will gradually occupy all parts of the United States where the gypsy moth can find suitable hosts. The already substantial cost of suppressing outbreaks will increase dramatically as ever larger areas of land become involved. The gypsy moth situation entered a new phase in 1981 when the pest defoliated over 13 million acres, giving us a glimpse for the first time of the potential of the insect to defoliate a geographic area so large that conventional control measures could not cope with the scale of the infestation and the cost of direct control was prohibitive.

At the same time it became clear that the gypsy moth will continue to move slowly out of the Northeastern States toward the south, midwest and west despite all efforts to constrain it. The so called "front" where the gypsy moth was moving into previously uninfested stands of hardwood trees has crossed the Mason-Dixon line and spot infestations caused by human activities flared up around the country.

Where resources were available, pest control personnel combatted the moth. These control experiences have been shared with others who were facing the moth for the first time thus accelerating the flow of information about the pest.

The level of research on the gypsy moth has been erratic in the past. The "modern" phase had its beginning in the 1960's. By 1971 it had become evident to researchers that much useable information had been accumulated about the gypsy moth. Together with new research tools and advances in handling microbial materials causing disease in gypsy moth it was thought an accelerated research program focused on gypsy moth would yield many dividends. The pace of research was increased in the early 1970's then given a major boost in 1975 with funding to support the Combined Forest Pest Research and Development Program. That program ended in 1978 after producing major research accomplishments. But it also left unfulfilled expectations--people had been hopeful that a complete solution to the gypsy moth problem would come from the Program.

Funding was reduced after 1978 and scientists resumed their base programs of research on the gypsy moth. Funding increases in 1983 and 1984 have made possible the initiation of new research, aimed specifically at developing the knowledge to ameliorate and ultimately prevent large scale outbreaks of gypsy moth.

Here are the research objectives of the new Program. Readers are encouraged to comment upon these objectives by contacting Dr. Gerry Hertel, USDA Forest Service, 370 Reed Road, Broomall, PA 19008.

Objectives:

1. Determine the effects of GM on forests.
 - 1.1 Develop tree growth and mortality functions to predict economic loss and guidelines for intervention against GM.
 - 1.2 Develop understanding of mechanisms affecting susceptibility or vulnerability of stands to GM attack.
2. Improve understanding of the biology and population dynamics of GM.
 - 2.1 Develop adequate sampling procedures for all stages of the GM.
 - 2.2 Characterize the biological processes influencing GM populations in susceptible population reservoirs.
 - 2.3 Ascertain the effect of environmental parameters of gross climate upon GM behavior and survival.

- 2.4 Understand the physiological relationship of GM to its hosts.
- 2.5 Understand dispersal; propensity to disperse, how far, redispersal, and initiation of feeding.
- 3. Develop the means to utilize parasites as regulators in low-level GM populations.
 - 3.1 Measure and increase mortality of GM by parasite species.
 - 3.2 Detect and collect exotic parasites as control.
 - 3.3 Determine the relationship between GM parasites and pathogens to increase their effectiveness.
- 4. Determine the role of invertebrate and vertebrate predators in low-level GM populations, including necessary biology and behavior.
 - 4.1 Evaluate GM mortality caused by vertebrate and invertebrate predator species.
 - 4.2 Understand the interactive relationship between predators and other natural enemies of the GM.
 - 4.3 Manipulate predators to enhance biological control.
- 5. Determine the role of selected pathogens and develop technology to utilize them as regulators in low to medium GM populations.
 - 5.1 Evaluate NPV, new strains, selected protozoa, fungi, and nematode for regulation of GM populations.
 - 5.2 Improve pathogen effectiveness under natural and managed conditions by broadening knowledge of pathogen distribution technology and the biotic and abiotic factors affecting effectiveness and survival.
- 6. Evaluate role of IPM for GM.
 - 6.1 Develop, evaluate, and integrate tactics and supportive technology for management of GM populations.
 - 6.1.1 Utilization and evaluation of parasite species
 - 6.1.2 Utilization and evaluation of predator species
 - 6.1.3 Evaluate potential use of inherited sterility
 - 6.1.4 Utilize NPV to suppress or dampen population increases
 - 6.1.5 Optimize use of chemical and microbial insecticides to suppress or dampen population increases

- 6.1.6 Combination treatments
- 6.1.7 Evaluate silvicultural practices as they affect the GM and its natural enemy complex
- 6.2 Develop and evaluate IPM strategy.
 - 6.2.1 Evaluate the concept of "foci" to explain the incipient phase of GM outbreaks
 - 6.2.2 Evaluate IPM in commercial forests
 - 6.2.3 Economics of IPM vs. no action
 - 6.2.4 Develop and evaluate a system for monitoring GM populations
- 7. Develop scientific technical support for GM management research.
 - 7.1 Develop and improve rearing technology of GM and its parasites and pathogens for research and evaluation purposes.
 - 7.2 Provide quarantine facilities for research, evaluation, and production of exotic pathogens, predators, and parasites.
 - 7.3 Develop interactive models for accessing and predicting GM numbers and impacts and management models for use by suppression agencies for making management decisions.

The following is a list of currently funded univeristy research projects. Following this listing, readers can find a brief summary of research being conducted within the Forest Service at Experiment Stations in Morgantown, West Virginia, Hamden, Connecticut and Broomall, Pennsylvania. Readers can obtain more information about these projects, or comment upon Program objectives by contacting Dr. Gerry Hertel, Program Manager.

Program Objectives	Principal Investigator	Performing Organization	Project Title
1	W. Merrill	Penn State University	Biodeterioration of oaks killed by gypsy moth defoliation
1	R. Hicks	West Virginia University	Vulnerability of mesophytic hardwood forests to spring insect defoliation

Program Objectives	Principal Investigator	Performing Organization	Project Title
1	R. Hicks	West Virginia University	Determination of mortality function for gypsy moth defoliated stands in the Appalachian Plateau
2	D. Miller	University Connecticut	Development of climate space-energy budget model of gypsy moth (<u>Lymantria dispar</u> L.) caterpillars
2	D Miller	University Connecticut	Quantification and prediction of the physical environment in Gypsy Moth (<u>Lymantria dispar</u> L.); habitats
2	M. Raupp	University of Maryland	Dynamics of gypsy moth and natural enemy populations within susceptible forest stands or foci
2	J. Elkinton	University Massachusetts	Movement of larval gypsy moths
2	C. Jones	Mary Flagler Cary Arboretum	Development of adequate larval and pupal sampling procedures
2	J. Schultz	Penn State University	Sources of variable foliage quality and its impact on gypsy moth performance
2	B. Parker	University of Vermont	Biological process influencing gypsy moth populations in susceptible and adjacent resistant forests

Program Objectives	Principal Investigator	Performing Organization	Project Title
2	B. Parker	University of Vermont	Parasitoids in low level gypsy moth populations in resistant and susceptible forests on Bryant Mountain
2	F. Ravlin	VPI & SU	Dynamics of gypsy moth and natural enemy populations within susceptible forest stands or foci
2	L. Butler	West Virginia University	Natural control factors of native macrolepidopterous defoliators of hardwoods in Cooper's Rock State Forest
3	M. Raupp	University of Maryland	Determine total mortality caused by parasites
3	J. Elkinton	University Massachusetts	Evaluate and improve methods of sampling parasitoids of gypsy moth
4	R. Holmes	Dartmouth College	The impact of avian predators on gypsy moth populations
4	H. Stribling	Penn State University	Effect of forest thinning and salvage on predators of the gypsy moth in central Pennsylvania
4	R. Yahner	Penn State University	Community structure of predators of gypsy moth effects of site susceptibility and habitat fragmentation

Program Objectives	Principal Investigator	Performing Organization	Project Title
4	E. Cameron	Penn State University	Invertebrate predators of the gypsy moth: Species involved and their role in pre-outbreak populations
4	R. Whitmore	West Virginia University	Vertebrate predator and gypsy moth population interactions and their influence on defoliation
5	H. Kaya	University of California	Biological control of the gypsy moth with the entomogenous nematodes, <u>Neoaplectana carprocapsae</u> and <u>N. bibionis</u>
5	J. Maddox	Illinois Department of Energy and Natural Resources	The use of microsporidia for population management of the gypsy moth
5	M. Ma	University of Maryland	Feasibility of using ELISA to quantify nucleopolyhedrosis virus in the gypsy moth ecosystem
6	J. Elkinton	University Massachusetts	Nucleopolyhedrosis virus dynamics in gypsy moth populations
6	W. Yendol	Penn State University	A study to determine spray distribution, effectiveness, and longevity of microbials used against the gypsy moth in the protection of eastern forests
6	M. Ma	University of Maryland	Development of monoclonal antibodies to gypsy moth nucleopolyhedrosis

Program Objectives	Principal Investigator	Performing Organization	Project Title
6	R. Tichenor	Maryland Department of Agriculture	Conduct and evaluate a pilot test to suppress gypsy moth populations in the Maryland Gypsy Moth IPM Area, using releases of F-1 sterile eggs
6	J. Elkinton	University Massachusetts	Development of a gypsy moth population monitoring system
6	R. Carde	University Massachusetts	Development of a monitoring trap for sampling adult gypsy moth males
6	C. Schwalbe	USDA, APHIS, OMDC	Development and evaluation of gypsy moth inherited sterility technique
6	I. Abrahamson	SUNY	Evaluation of "FOCI". A valid concept to explain the incipient phase of gypsy moth outbreaks
6	C. Pitts	Penn State University	Development of a gypsy moth population monitoring system
6	F. Ravlin	VPI & SU	Development of a gypsy moth population monitoring system
7	C. Schwalbe	USDA, APHIS, OMDC	Produce and distribute gypsy moth life stages
7	T. O'Dell	NEFES, Hamden	Quality control of reared insects
7	C. Schwalbe	USDA, APHIS, OMDC	Stockpile eggs for sterile male-85

In-house Forest Service Research

Forest Service Research supported in-part by the Gypsy Moth Research Program includes scientists from Hamden, Connecticut; Morgantown, West Virginia; and Broomall, Pennsylvania. At the Hamden lab research focuses upon: 1) larval behavior studies, 2) continued parasite studies, 3) insect-host relationships, 4) integrated pest management evaluations, 5) improving upon selected pathogens and application technology, 6) forecasting naturally occurring virus epizootics, and 7) tree predisposition to dieback and decline.

At Morgantown, research focuses upon: effects (including impacts) of damage by gypsy moth, 2) silvicultural practices to reduce damage, and 3) development of a decision-support system for resource managers.

At Broomall, research attempts to provide guidelines for effective decisions among management alternatives and competing uses.

A GYPSY MOTH-APPLIED RESEARCH PROJECT

Every so often (probably not as often as we like) research efforts become part of an operational program. This summary provided by Stan Hood, Chief of the Bureau of Insect Pest Control, Massachusetts Department of Environmental Management, reports upon the practical application of research. The research was conducted by Dr. J. Elkinton of the University of Massachusetts.

Massachusetts and the Gypsy Moth Numbers Game

Some authorities believe that the control of early rising gypsy moth populations may prevent large outbreaks. This approach in the management of the gypsy moth has been proposed by entomologists for many years. On the other hand, certain other entomologists theorize that when the gypsy moth is ready to increase to epidemic proportions it will do so area wide and controlling the population on early rising areas will have little or no effect on the overall population increase. The Bureau of Insect Pest control is about to embark on a project to determine which line of thought is correct.

Until recently neither of these theories could be demonstrated satisfactorily. Recent developments, however, resulting from research work being conducted by the Entomology Department at the University of Massachusetts has indicated that it may be possible to monitor very low populations to accurately predict the start of a rising population. Past history and many years of experience tell us that gypsy moth populations do rise and fall. The problem has been putting this phenomenon into some sort of prediction time table. It has been impossible to do.

For a number of years now it has been known that male gypsy moths can be lured to traps baited with a synthetically produced natural pheromone emitted by the female to attract the male at mating time. Armed with the knowledge that these traps work extremely well to detect newly introduced, but still as yet very low population levels of the pest on the outskirts of the generally infested area, it was postulated that perhaps male gypsy moth traps should be put to a useful purpose in Massachusetts.

It has also been known that the ratio of male to female gypsy moths is also an indicator of the status of the population. It is felt that information concerning male moth numbers combined with sex ratio information could be useful in predicting rising populations.

Following two years of intensive research, both the U. S. Forest Service and the University of Massachusetts Entomology Department feel that we are ready to try it on a practical basis. Present plans are for the Bureau of Insect Pest Control to establish 200 permanent sites throughout the Commonwealth. Location of the sites will be dependent upon their susceptibility to gypsy moth outbreaks as determined by past history. Each site will contain a center tree near which will be placed a baited trap. Twenty other trees in the near vicinity will be wrapped with strips of burlap. Due to the habit of the gypsy moth caterpillars to search out resting areas during their latter instars, it has been found that burlap strips are favored. Following the pupal stage in the life cycle of the pest, the area under the burlap will be examined and all empty pupal cases collected. It will then be possible to determine the sex ratio.

Later in the season all of the traps which were in place prior to the moth flight will be collected and the captured male moths counted. It is the intention of the Bureau to continue this work on an annual basis. As the data from each plot site is analyzed from year to year, it is hoped that population increase at any one site will become obvious. When and if this should happen, it will trigger the next Bureau action i.e., develop a plan to suppress the gypsy moth population on and in the vicinity of the site in question.

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